Alg. 2 Warm Up # 8-4

Solve. Check for extraneous solutions.

$$\sqrt{22x + 5} - \sqrt{2x} = 5$$

HW Questions: Preview

8-70. Write each of the following expressions in the form $a + bi$.

a. $-18 - \sqrt{-25}$ b. $\frac{2 \pm \sqrt{-16}}{2}$ c. $5 + \sqrt{-6}$

8-71. Explain why $i^3 = -i$. What does i^4 equal?

8-72. If $f(x) = x^2 + 7x - 9$, calculate the values in parts (a) through (c) below.

a. $f(-3)$ b. $f(i)$ c. $f(-3+i)$

$i = \sqrt{-1}$

$i^2 = (\sqrt{-1})^2 = -1 \rightarrow \boxed{i^2 = -1}$

$i^3 = i^2 \cdot i^1$

$= -1(i) \rightarrow \boxed{i^3 = -i}$

$i^4 = i^2 \cdot i^2$

$= (-1)(-1) \rightarrow \boxed{i^4 = 1}$:)

HW Questions:

Preview

8-70. Write each of the following expressions in the form $a+bi$.

a. $-18-\sqrt{-25}$

b. $\frac{2\pm\sqrt{-16}}{2}$ → $\frac{2}{2}\pm\frac{\sqrt{16}\sqrt{-1}}{2}$ → $1\pm\frac{4i}{2}$ → $1\pm 2i$

c. $5+\sqrt{-6}$ → $5+\sqrt{6}\sqrt{-1}$ → $5+\sqrt{6}\,i$

8-71. Explain why $i^3=-i$. What does i^4 equal?

8-72. If $f(x)=x^2+7x-9$, calculate the values in parts (a) through (c) below.

a. $f(-3)$

b. $f(i)$

c. $f(-3+i)$

b) $f(i)=i^2+7i-9$

$=-1+7i-9$

$f(i)=-10+7i$

$f(-3+i)=(-3+i)^2+7(-3+i)-9$

$=9-6i+i^2-21+7i-9$

$=-21+i+(-1)$

$=-22+i$

8-73. Is $5+2i$ a solution to $x^2-10x=-29$? How can you be sure?

plug it in!

$(5+2i)^2-10(5+2i)\stackrel{?}{=}-29$

$25+20i+4i^2-50-20i\stackrel{?}{=}-29$

$-25+4(-1)\stackrel{?}{=}-29$

$-29=-29$ ✓

8-74. Solve $16^{(x+2)}=8^x$.

$(2^4)^{x+2}=(2^3)^x$

$4x+8=3x$ ...

8-75. Is $(x-5)^2$ equivalent to $(5-x)^2$? Explain why or why not.

8-76. Calculate the value of each expression below.

a. $\sqrt{-49}$ b. $\sqrt{-2}$ c. $(4i)^2$ d. $(3i)^3$

8-77. Find the inverse functions below.

a. If $f(x) = 2x - 3$, then what does $f^{-1}(x)$ equal?

b. If $h(x) = (x-3)^2 + 2$, then what does $h^{-1}(x)$ equal?

8-78. Solve each equation.

a. $5.2(3.75)^x = 100$

b. $4 + 3x^4 = 81$

$\frac{3x^4}{3} = \frac{77}{3}$

$\sqrt[4]{x^4} = \pm\sqrt[4]{\frac{77}{3}}$

$x \approx \pm$

Yesterday's CP's

8-65. In the 1500s, an Italian mathematician named ~~Rafael Bombelli~~ invented the imaginary number $\sqrt{-1}$, which is now called i. $\sqrt{-1} = i$ implies that $i^2 = -1$. After this invention, it became possible to find solutions for $x^2 + 1 = 0$; they are i and $-i$. The value of $\sqrt{-16} = \sqrt{16(-1)} = \sqrt{16i^2} = 4i$. Use the definition of i to rewrite each of the following expressions.

a. $\sqrt{-4}$ $2i$

b. $(2i)(3i)$ $6i^2$ $6(-1)$ -6

c. $(2i)^2(-5i)$ $4i^2(-5i)$ $4(-1)(-5i)$ $(-4)(-5)(i)$ $20i$

d. $\sqrt{-25}$ $\sqrt{25}\sqrt{-1}$ $5i$

8-66. Graph the function $y = x^2 - 4x + 5$.

a. Does the graph cross the x-axis? Should the equation $x^2 - 4x + 5 = 0$ have real solutions?

b. Use the Quadratic Formula to solve $x^2 - 4x + 5 = 0$. Use your new understanding of imaginary numbers to simplify your results as much as possible. $x = 2 \pm i$

c. A real number plus (or minus) a multiple of i, like each of the solutions to $x^2 - 4x + 5 = 0$, is called a **complex number**. Check one of your solutions from part (b) by substituting it into the equation for x and simplifying the result.

There's magic in the check!

$(2+i)^2 - 4(2+i) + 5 \stackrel{?}{=} 0$

$4 + 4i + i^2 - 8 - 4i + 5 \stackrel{?}{=} 0$

$-1 + 1 = 0$ ✓ :)

CP's: 7- #50 ---> 52

P. 328

7-50. Obtain a copy of the Lesson 7.1.4A Resource Page from your teacher. You will use the same process to graph the cosine function as you did to graph the sine function, but you need to use the base of the triangle instead of the height.

a. Label the length of the base of each triangle in the unit circle. Plot these lengths at their angle location on the coordinate system to the right of the circle. You will be plotting points in the form (x = angle in degrees, y = base).

b. Draw five new triangles that are congruent to the first five, but that are located in the second quadrant. Label the angle measure (from 0°) and the base for each triangle. Add five new corresponding points to the graph.

c. Continue this process by drawing triangles in the third and fourth quadrants. You should have a total of twenty triangles drawn and twenty points plotted. Then find the four points where the circle crosses the axes and label them with both their angle measures and their horizontal distances from the origin. Add points for these to the graph on the right as well. Finally, sketch a smooth curve through the points.

d. Compare this graph to the sine graph you got from graphing heights in problem 7-14. How are the two graphs similar? How are they different?

7-51. Remember the scary Ferris wheel, *The Screamer*? LaRasha does! She was riding *The Screamer*, sitting 27 horizontal feet away from the central support pole, when the ride stopped. What was her seat's angle of rotation? Is there more than one possibility? Justify your answer using as many representations as you can.

7-52. UNIT CIRCLE ↔ GRAPH

In problem 7-51, did you use a graph of $y = \cos\theta$ to find lengths of bases of triangles?

a. Use the Lesson 7.1.4B Resource Page (a cosine-calculator graph) provided by your teacher to find the length of the base of a triangle formed by a seat on *The Screamer* that had rotated 130° from the starting platform.

b. Are there any other triangles with the same base? If so, mark their corresponding points on your cosine calculator.

c. How can you use the symmetry of the cosine-calculator graph to calculate the angle location of seats on *The Screamer* that have the same base? Is your method different than the one you used to find the heights?

Week 8 Classwork:

Warm up

CP's: 7- # 33, 34

CP's: 7- # 45 ---> 49

Salmon - quiz practice

CP's: 8- # 63 ---> 67

CP's: 7- # 50 ---> 52
(pink)

HW: 7-

62 ---> 70

Quiz tomorrow:

Solve quadratics by factoring and completing the square.

Solve a radical equation.